

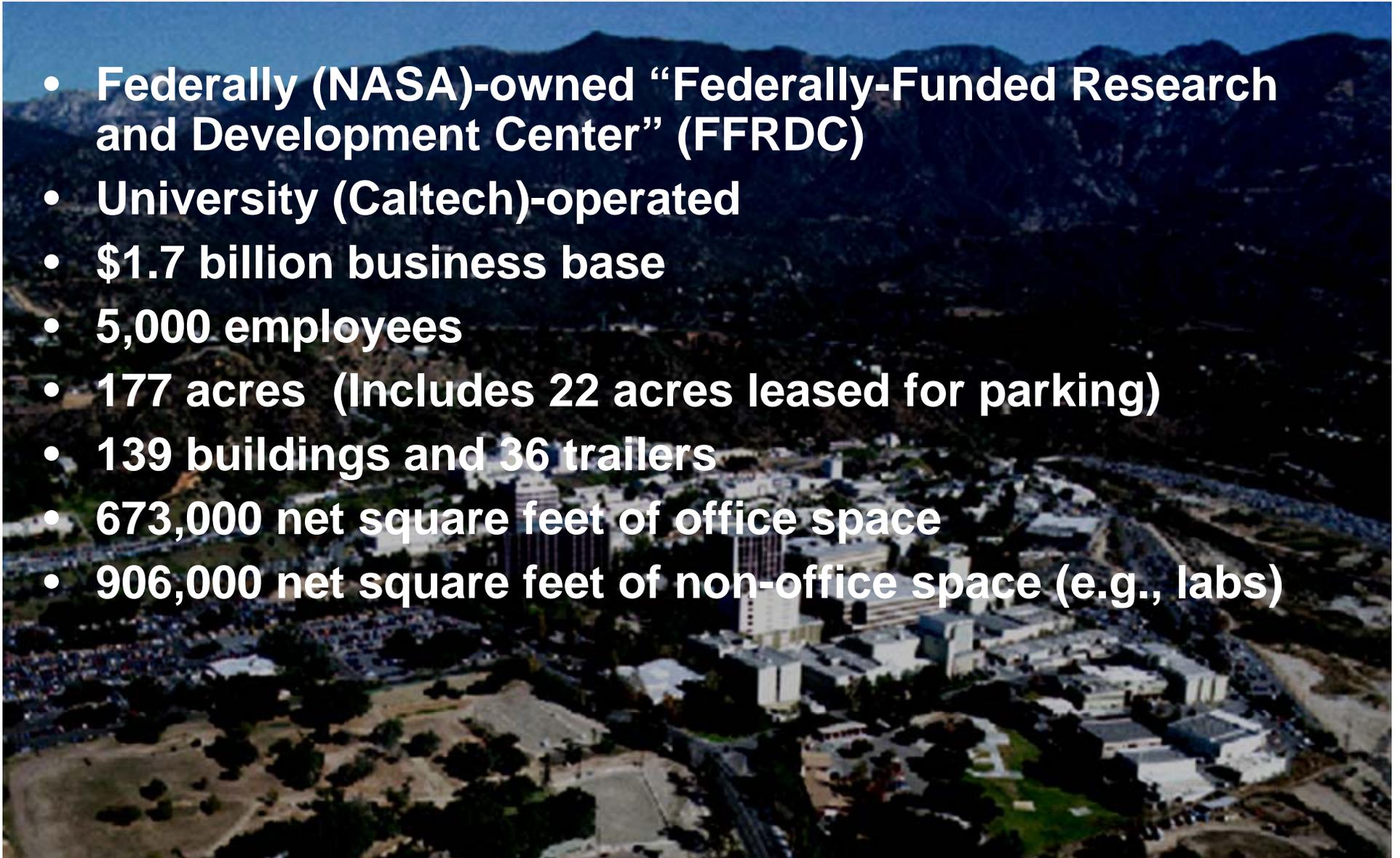
# ***JPL Partners With Industry on NASA's Robotic Missions***

**Lt. Gen. Eugene Tattini, USAF, Ret.**



# JPL is part of NASA and Caltech

- Federally (NASA)-owned “Federally-Funded Research and Development Center” (FFRDC)
- University (Caltech)-operated
- \$1.7 billion business base
- 5,000 employees
- 177 acres (Includes 22 acres leased for parking)
- 139 buildings and 36 trailers
- 673,000 net square feet of office space
- 906,000 net square feet of non-office space (e.g., labs)



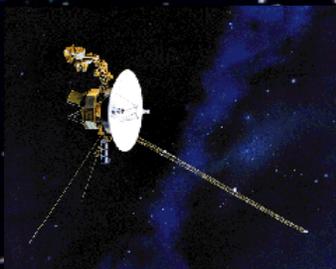
# Nineteen spacecraft and seven instruments across the solar system... and beyond



Spitzer studying stars and galaxies in the infrared



GALEX surveying galaxies in the ultraviolet



Two Voyagers on an interstellar mission



Ulysses and ACRIMSAT studying the sun



Dawn on way to study asteroids Vesta and Ceres



Wide Field Planetary Camera 2 on Hubble Space Telescope



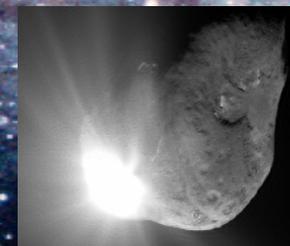
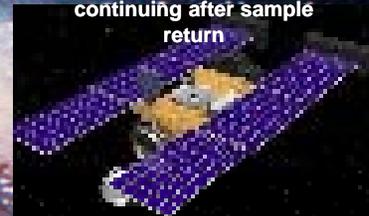
Cassini studying Saturn



Mars Odyssey and Mars Reconnaissance Orbiter in orbit. Rovers "Spirit" and "Opportunity" in extended missions. Phoenix launched to Mars' north pole.



Stardust carrier continuing after sample return

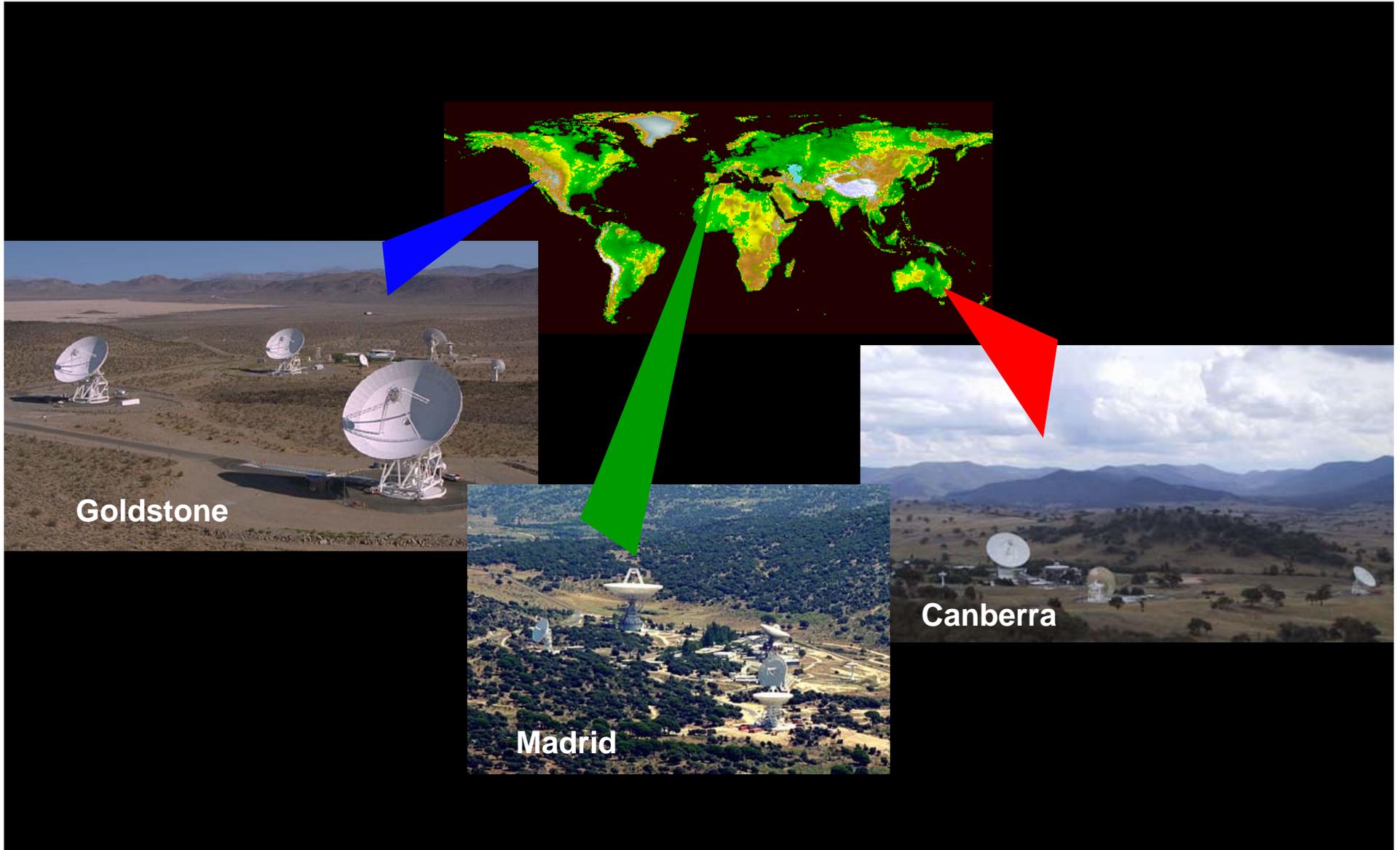


Deep Impact carrier continuing after hitting comet Tempel 1.

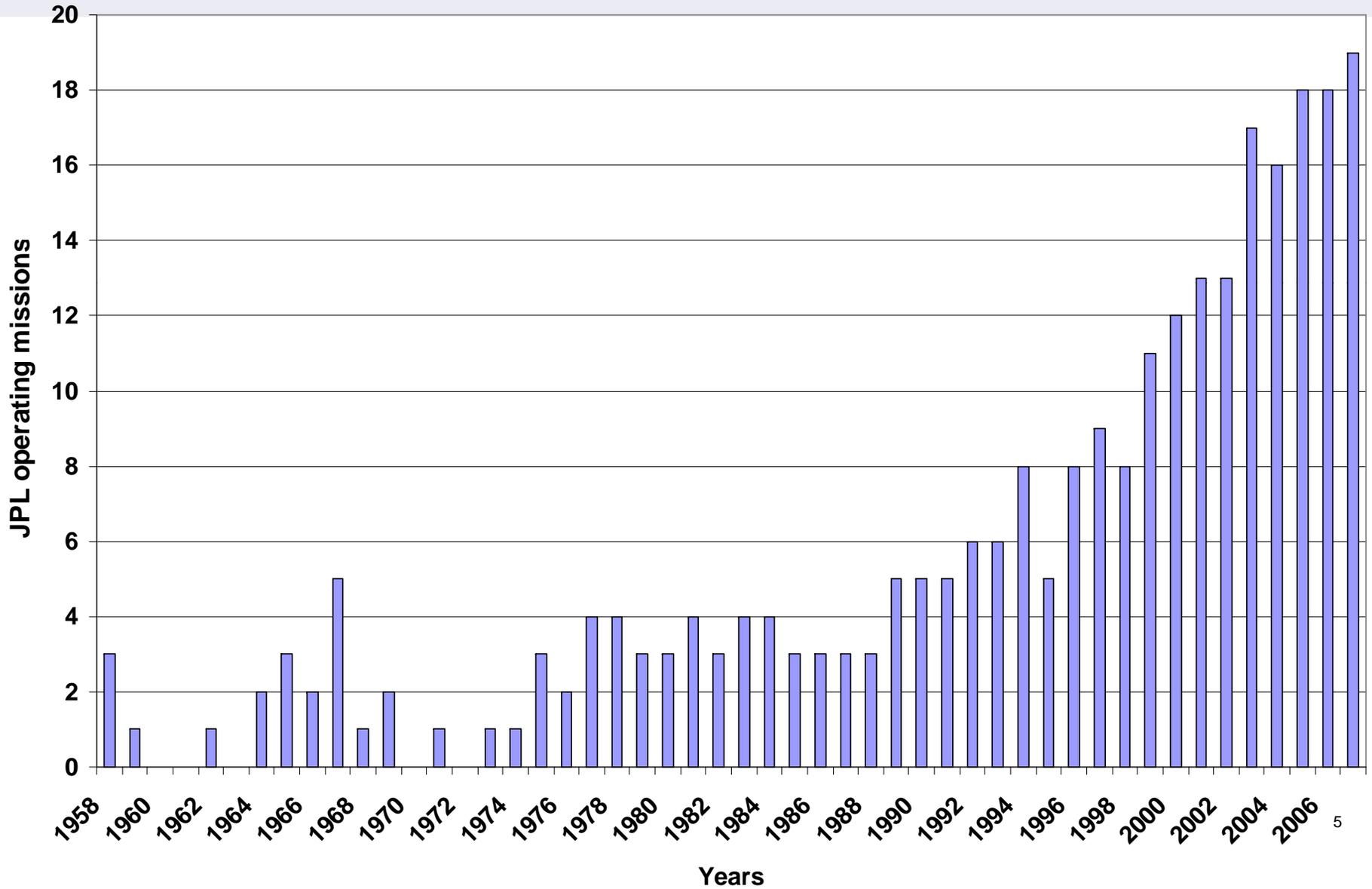


QuikScat, Jason 1, CloudSat, and GRACE (plus ASTER, MISR, AIRS, MLS and TES instruments) monitoring Earth. MIRO on ESA Rosetta comet mission.

# Deep space exploration enabled by NASA's Deep Space Network (DSN)

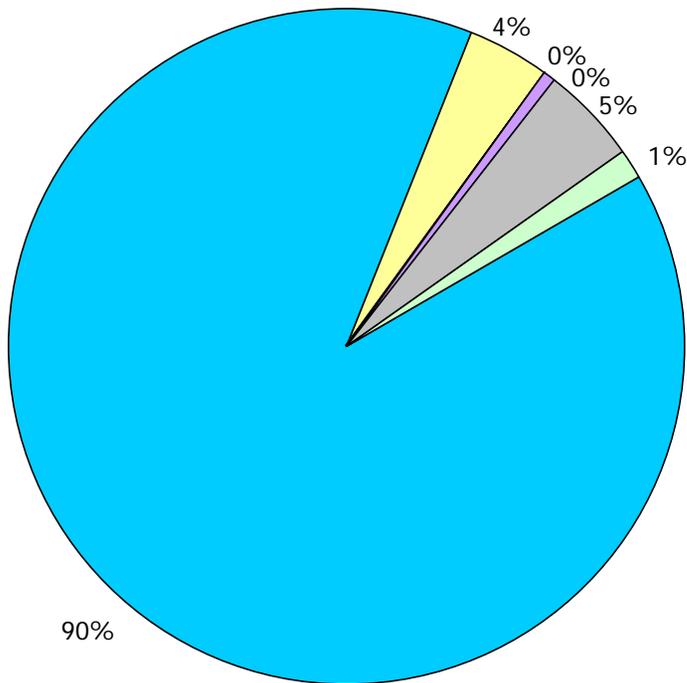


# JPL operating missions over the last half century



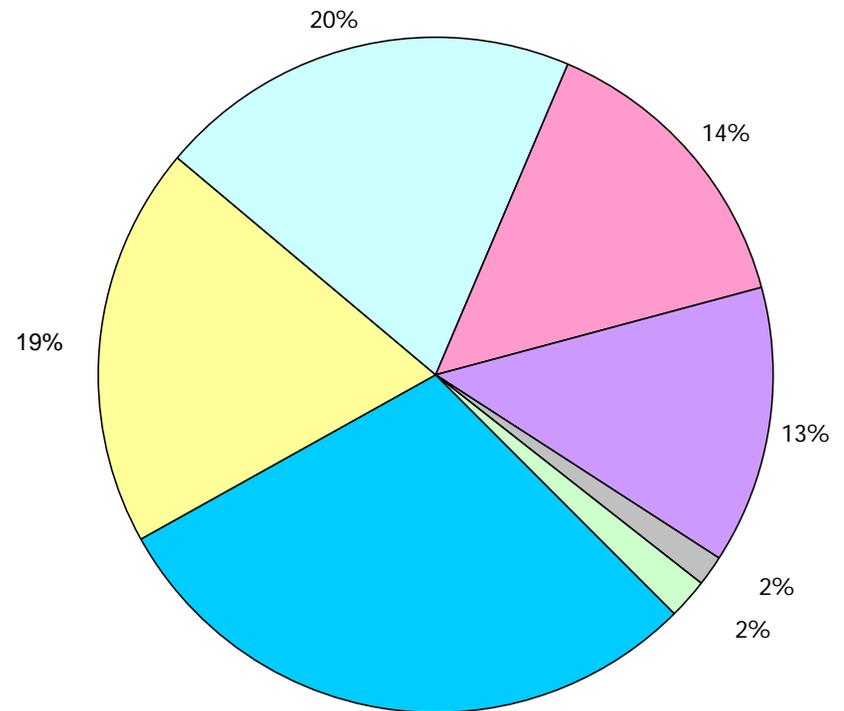
# JPL funding distribution for FY07 (\$1.61 billion business base)

By NASA Office or Other Sponsor



- SMD
- ESMD
- Aeronautics
- Education
- Space Operations
- Reimbursable
- Other

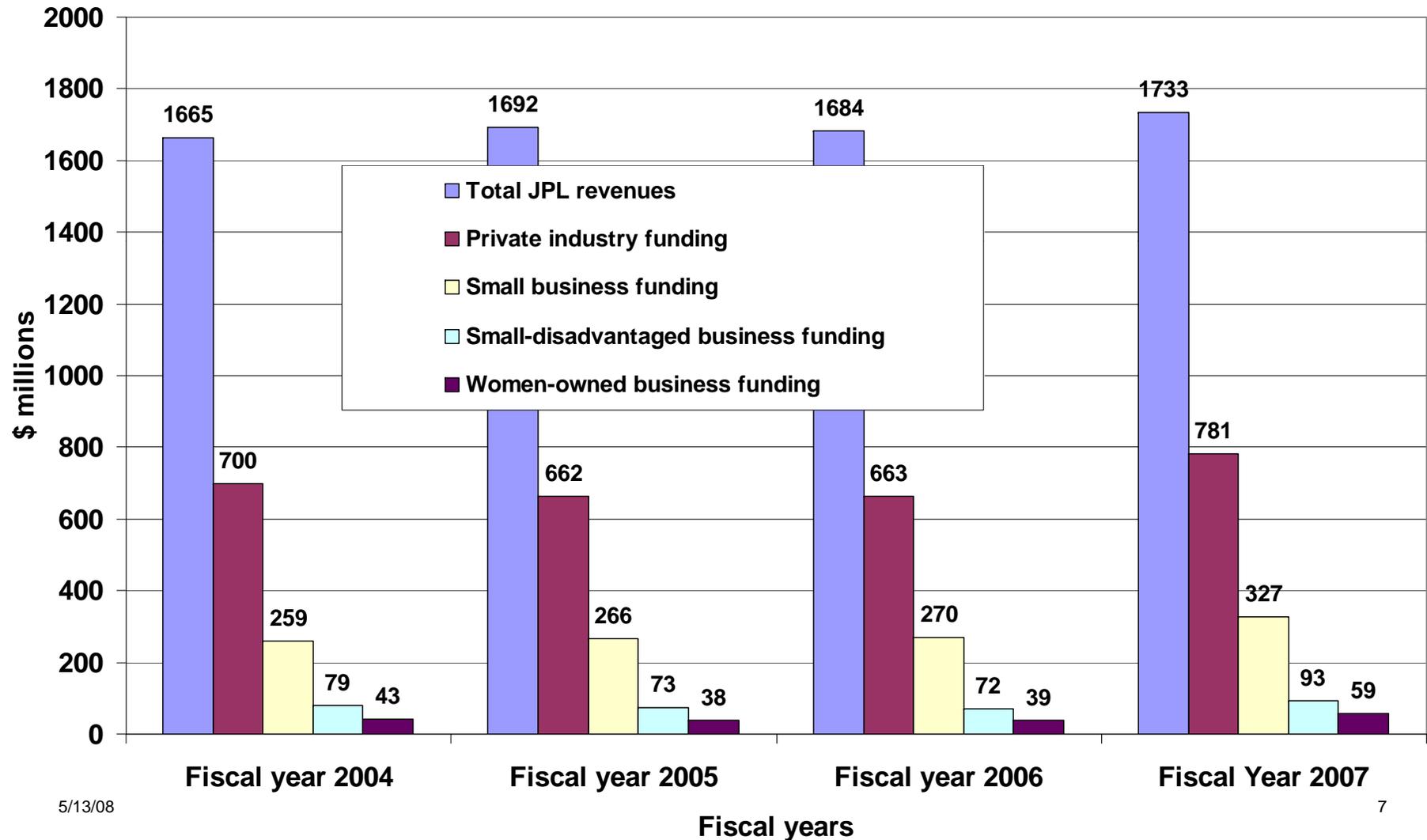
By Implementing JPL Directorates



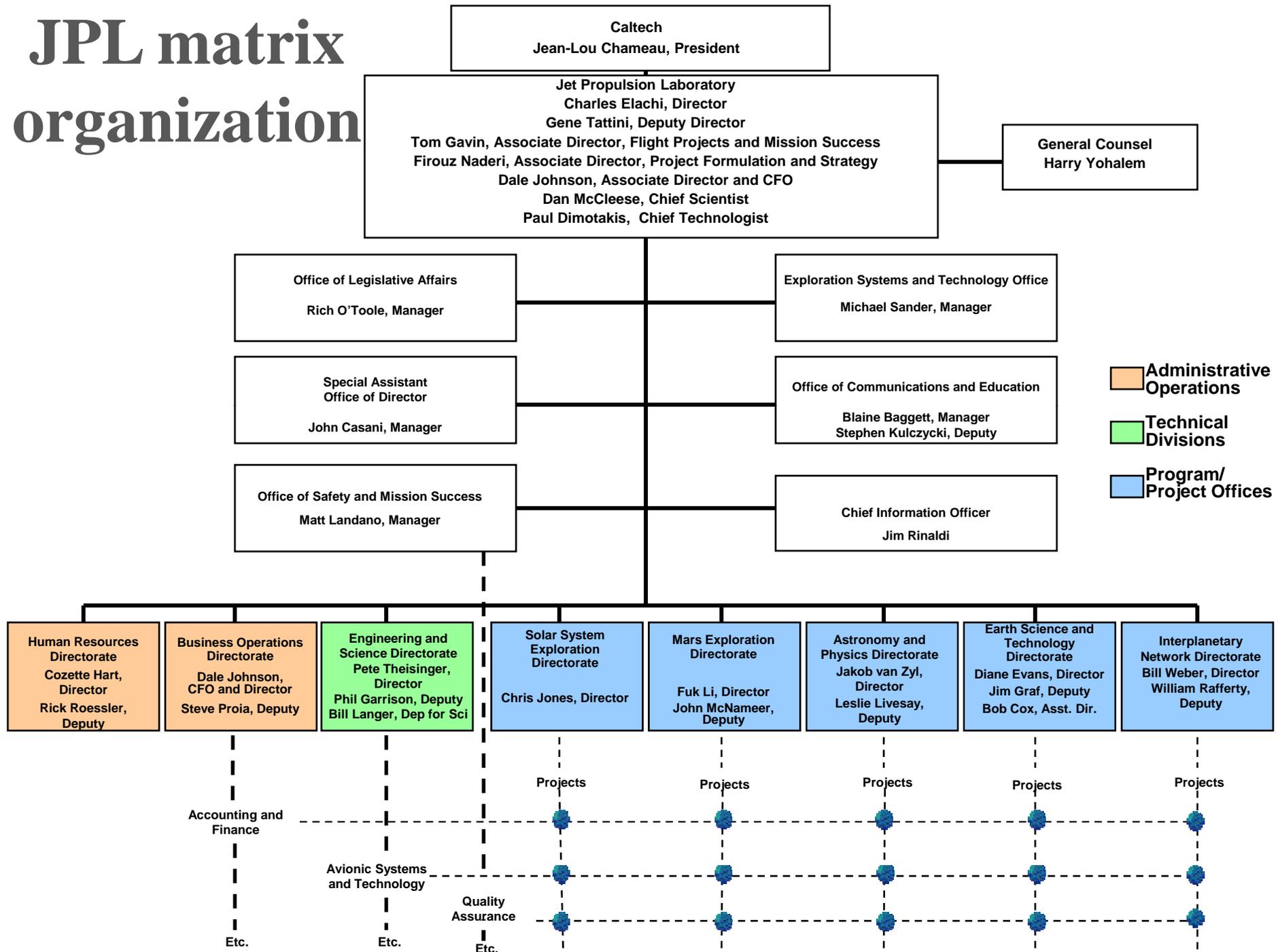
- Mars Explorations
- Astronomy & Physics
- Earth Science and Tech
- Interplanetary Network
- Solar System
- ESTO
- Others

NASA Percentages based on FY 07 President's Budget  
Tattini Ind Day

# JPL industry and small business funding



# JPL matrix organization





# Executive Council

August 2007

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DEPUTY DIRECTOR EUGENE L. TATTINI	

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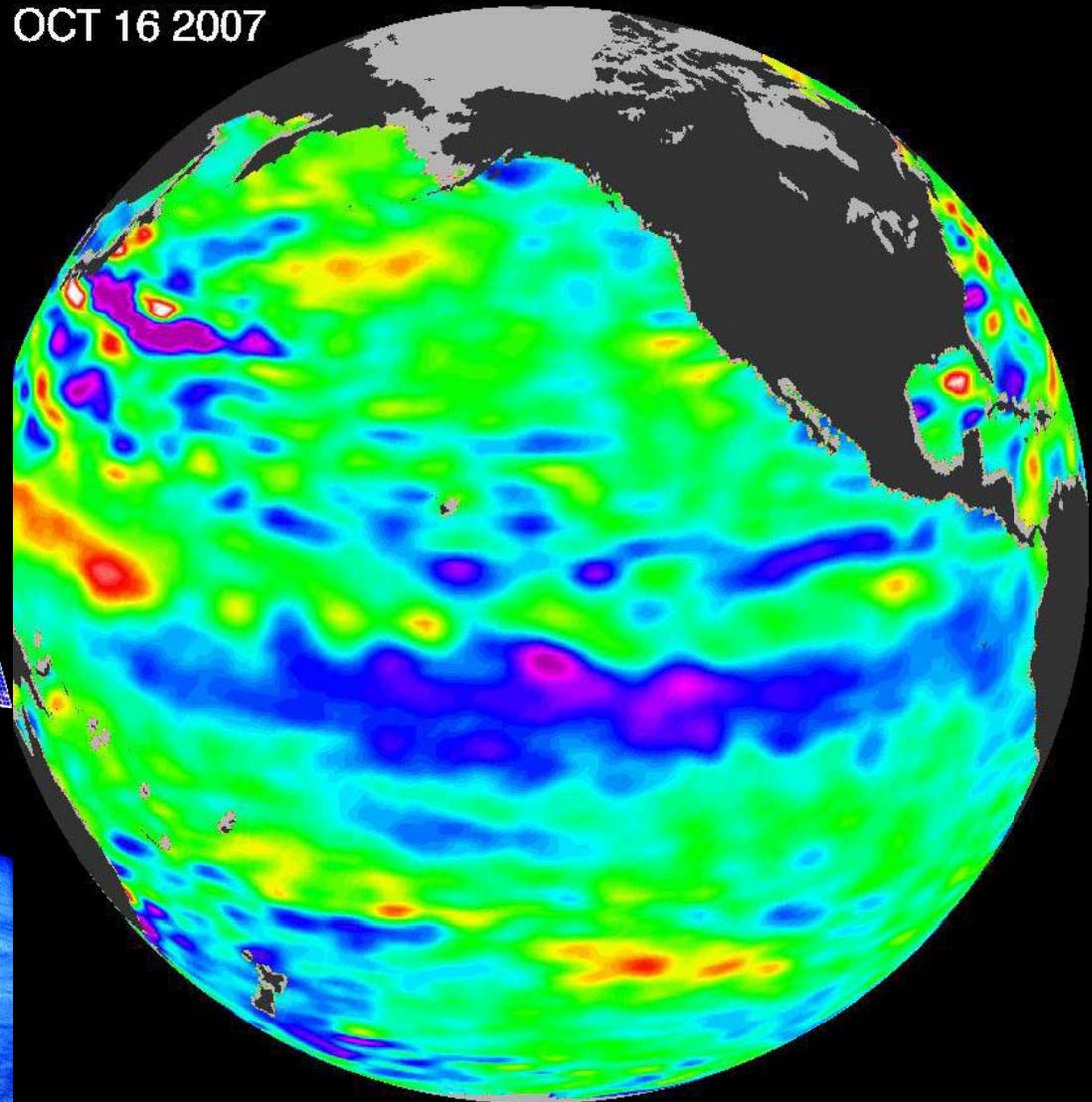
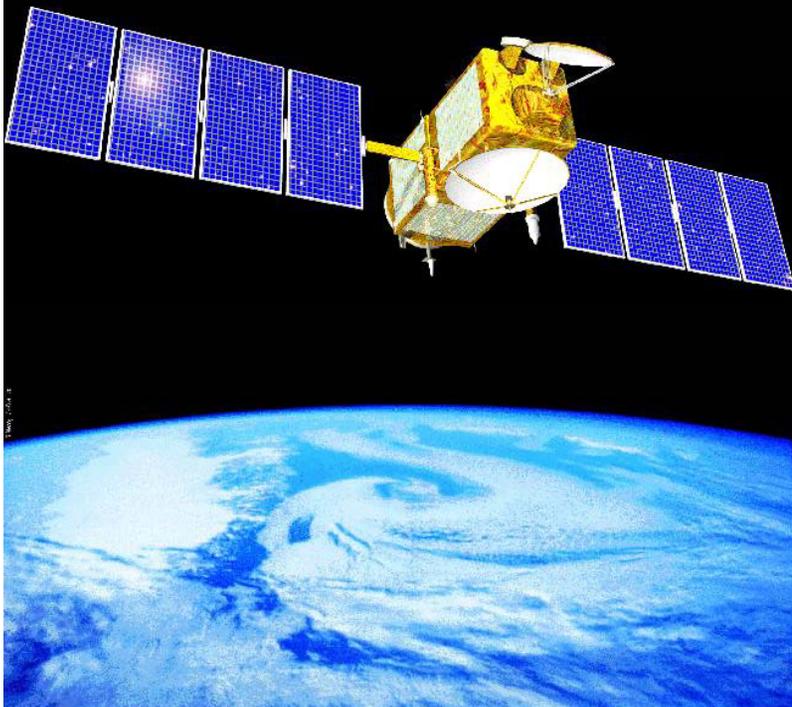
EARTH SCIENCE & TECHNOLOGY DIRECTORATE 800 DIANE L. EVANS	
--------------------------------------------------------------------	---------------------------------------------------------------------------------------

INTERPLANETARY NETWORK DIRECTORATE 900 WILLIAM J. WEBER	
------------------------------------------------------------------	---------------------------------------------------------------------------------------

# Radar, instrument, communication technologies enable ocean science

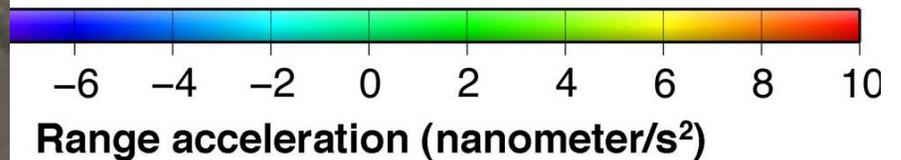
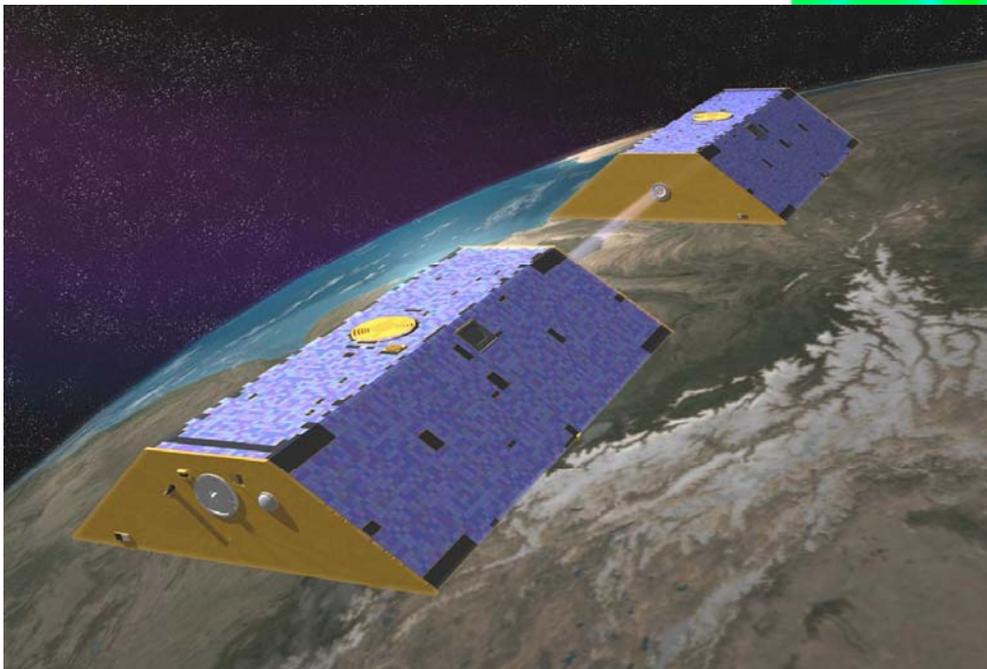
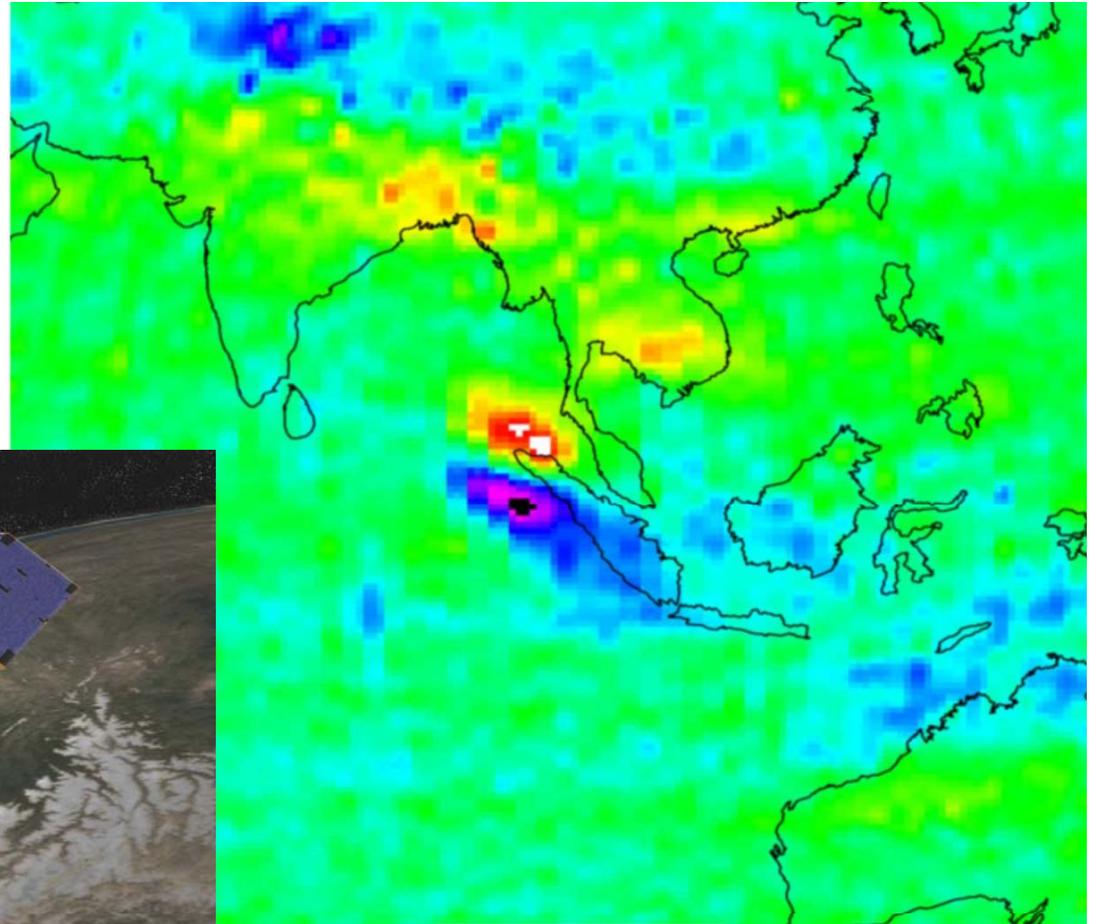
OCT 16 2007

**Jason-1 measures  
ocean elevations to  
centimeter accuracy**



# Navigation, guidance, control and measurement technologies enable precise gravity measurement

**GRACE**  
measurement of  
tsunami crust  
displacement  
gravity change



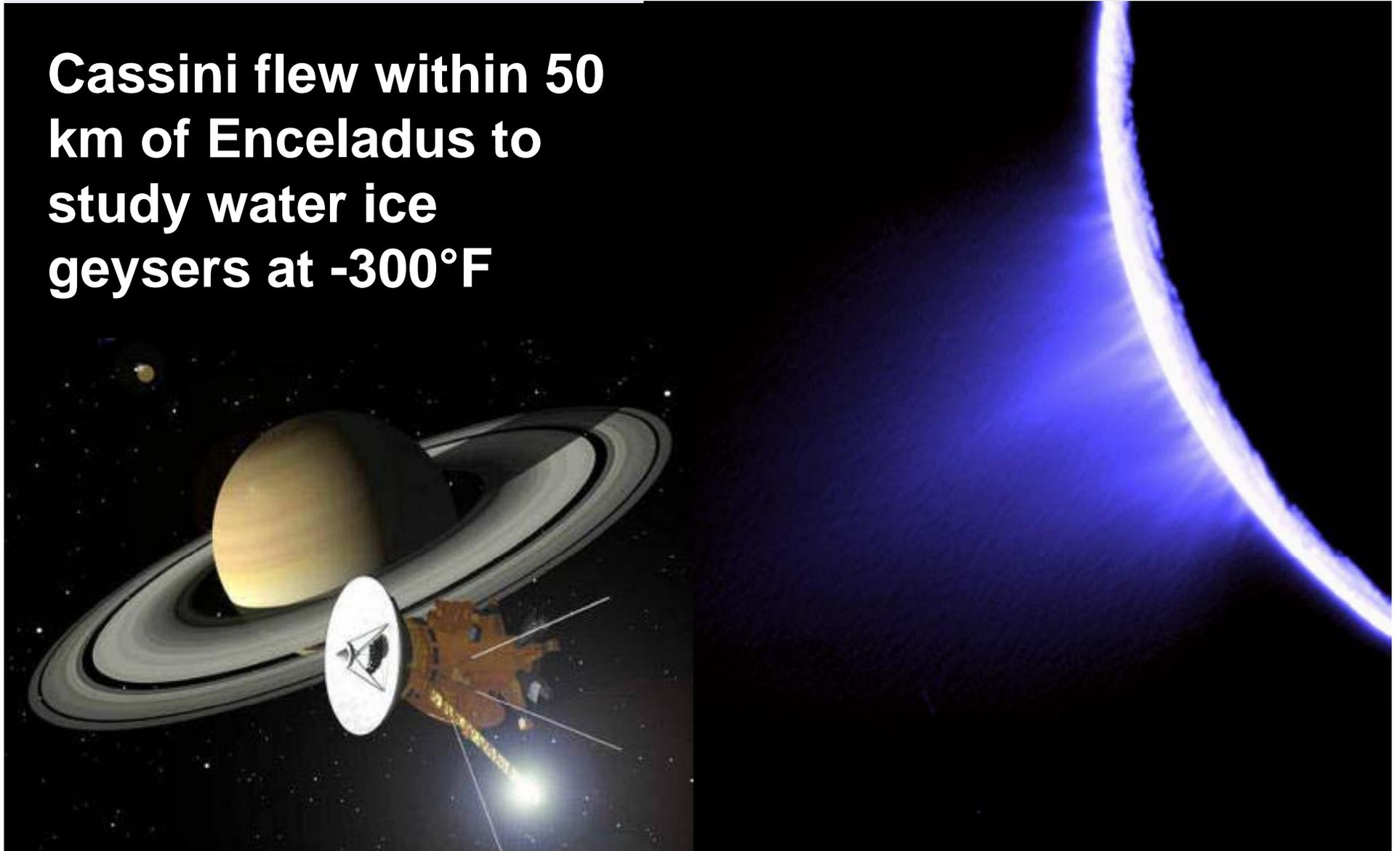
# Optics, telecommunication and data technologies enable MRO to catch a Mars landslide



**Landslide in Mars polar  
crater from Mars  
Reconnaissance Orbiter  
HiRISE camera**

# Imaging, navigation technologies enable Cassini to see water ice jets on Saturn's moon Enceladus

**Cassini flew within 50 km of Enceladus to study water ice geysers at  $-300^{\circ}\text{F}$**



# Solar electric ion propulsion enables Dawn orbiting of asteroids Vesta and Ceres



**Launched Sept. 27, 2007;  
orbits Vesta in 2011; and  
orbits Ceres in 2015.**

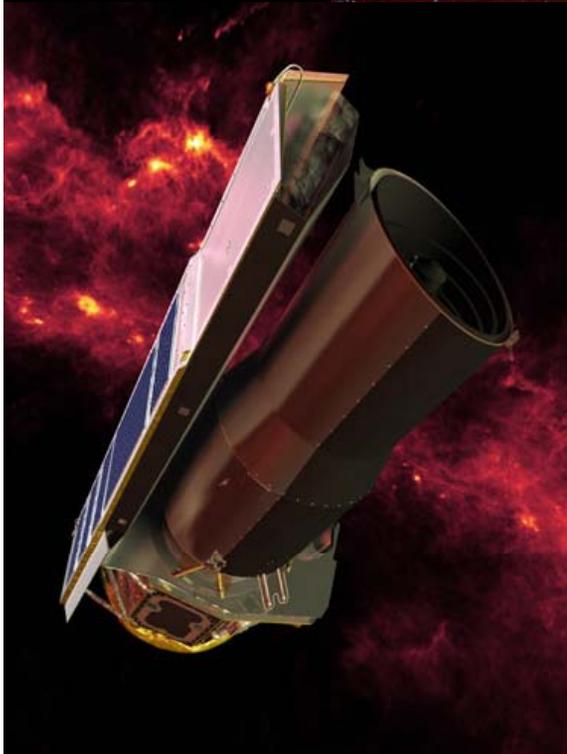
# Measurement and data technologies will enable SIM to study exosolar “Earths”

**Space Interferometer Mission (SIM) knowledge of telescope mirror positions measured to picometers (less than diameter of hydrogen atom).**



# Cryogenics and thermal control enable Spitzer Space Telescope to see *Mountains of Creation*

**Spitzer infrared telescope sensors cooled to near absolute zero.**



# Technology Innovation Results

- 300 new technologies reported and evaluated per year
- 12 spin-off companies within three years
- 90 patents filed per year, including provisional filings
- 150 industry R&D partnerships per year

# JPL Technology Spin-offs

Photobit Corporation active pixel sensor

- Small size and low power image sensor



Quantum well infrared photodetector (QWIP) camera for cancer detection

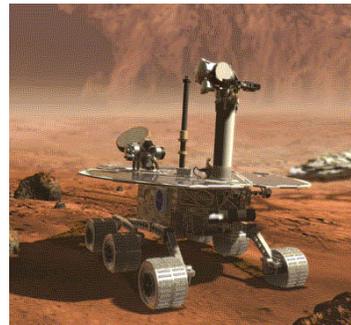
- High sensitivity
- Useful for detecting brain, breast, and skin tumors



# Industry provides enabling capabilities for robotic Space Science missions



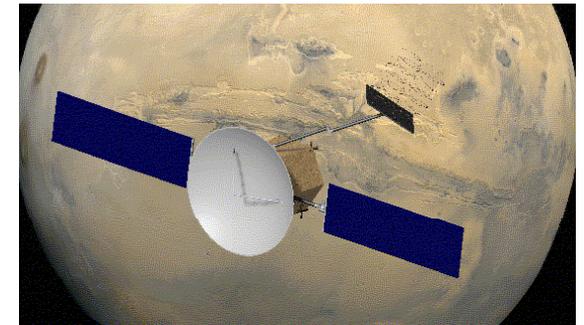
**End-to-end system engineering**



**Autonomous mobility**



**Deep space communications**



**Deep space navigation and highly stable clocks**



**Extreme precision formation flying for science and rendezvous**



**High precision spaceborne systems in optical to sub-millimeter, including interferometry**



**Active sensors for mapping and positioning (SAR, altimeters, GPS)**

# Getting to know the NASA and JPL families better...

...and their wide range of missions and discoveries.



Jet Propulsion Laboratory

*<http://www.jpl.nasa.gov>*

JPL Acquisition Division

*<http://acquisition.jpl.nasa.gov/default.htm>*

JPL Business Opportunities Office

*<http://acquisition.jpl.nasa.gov/boo>*

NASA

*<http://www.nasa.gov>*

Small Business Administration

*<http://www.sbaonline.sba.gov>*